12 represents the more linear response characteristic resulting from use of an electrode unit of the type in which the electrode elements are spaced a short distance from the material during the test.

The use of a cover plate or other spacing means over the electrode element of course results in a decrease in the amount of power absorbed by the sample of material on test, which is due to the material being moved out of the more concentrated regions of the electrostatic field. The decrease in power absorbed is proportionately greater for samples of higher power absorbing characteristics than for those of low power absorbing characteristics, which of course results in the above noted change in the characteristic response curve of the system. Thus by this means the shape of the response curve may be varied within certain limits to suit the requirements of the application at hand.

Figs. 13 and 14 show an electrode designed for measurement of the relative humidity of the atmosphere or of a gas under test. The electrode elements are indicated at 60 and 61, being illustratively of the type shown in Figs. 1 and 2, these electrode elements being mounted again on an insulation block 62. As appears in Fig. 14, the outer faces of the electrode elements are again flush with the forward face 63 of the insulation block. The forward face of the unit is covered with a coating 64 of a hygroscopic substance, which readily absorbs moisture from the atmosphere, and whose moisture content maintains a known relation to the relative humidity of the atmosphere. This coating 64 may consist of any one of various cellulose compounds dissolved by a suitable solvent and coated on the surface of the electrode unit. For instance, cellulose acetate may be dissolved in acetone, forming a lacquer which may be applied as a thin coating 64 to the front face 63 of the unit. The moisture content or layer 64 varies with the relative humidity of the atmosphere, and the power absorbed by this coating or layer from the electrostatic field of the electrode element varies directly with the absorbed moisture content. Accordingly, a suitable moisture register system connected to the terminals of electrode plates 60 and 61 and designed to register in accordance with power absorbed from the field of the electrode elements, will give an indication which may be calibrated directly in terms of relative humidity.

The electrode units herein illustrated and described are but illustrative of various forms and proportions typical of the present invention, which is not to be considered as limited in its broad scope to the specific forms shown; and the broad invention as well as the appended claims are therefore to be considered as contemplating electrode units involving all equivalent modifications in design, dimensions, construction and arrangement.

We claim:

1. A high frequency test device for testing qualities of dielectric materials, comprising a support, and a pair of coplanar, multiply-branched and interfitted electrode elements mounted at uniform spacing and electrically insulated from one another on said support, said elements each comprising a plurality of radially spaced concentric rings, the rings of one electrode element being disposed in the spaces between rings of the other electrode element, and there being a series of uniform width gaps between the adjacent rings of the two electrode elements, the electrode elements being at no place more closely spaced than the width of said gaps.

2. A high frequency test device for testing qualities of dielectric materials, comprising a support, and a pair of coplanar, multiply-branched and interfitted electrode elements mounted at uniform spacing and electrically insulated from one another on said support, said elements each comprising a plurality of radially spaced concentric rings, the rings of one electrode element being disposed in the spaces between rings in the other electrode element, and there being a series of uniform width gaps between the adjacent rings of the two electrode elements, the rings of each electrode element being interrupted along a radial line, and each electrode element having a radially extending connecting strip lying along the radial line of interruption of the rings of the other electrode element, the electrode elements being at no place more closely spaced than the width of said gaps.

3. A high frequency electrostatic device for testing qualities of dielectric materials, comprising a support, and a pair of coplanar electrode plates of substantially ring-like formation and having substantially equal, uniform widths mounted at uniform spacing and electrically insulated from one another on said support, said electrode plates being adapted to be positioned by said support adjacent the surface of a material to be tested, said electrode plates having opposed edge portions defining a high frequency gap of substantially uniform width, and being at no place more closely spaced than the width of said gap, such that a high frequency electrostatic field extends across said gap between said edge portions and forwardly of said electrode plates to penetrate a material to be tested when said plates are connected to a source of high frequency current.

4. A high frequency electrostatic device for testing qualities of dielectric materials, comprising a support, and a pair of coplanar, multiply-branched interfitted electrode plates mounted on and electrically insulated from one another on said support, the widths of each of the branches of said electrode plates being uniform along the lengths thereof, said electrode plates being adapted to be positioned by said support adjacent the surface of a material to be tested, and the branches of said pair of electrode plates having opposed edges defining a high frequency gap of substantially uniform width, and of a width dimension of the same order as the width dimensions of said electrode plate branches, and being at no place more closely spaced than the width of said gap, such that a high frequency electrostatic field extends across said gap between said edge portions and forwardly of said electrode plates to penetrate a material to be tested when said plates are connected to a source of high frequency current.

5. A high frequency electrostatic device for testing qualities of dielectric materials, comprising a support, and a pair of coplanar, multiply-branched interfitted electrode plates of foil-like thinness mounted on and electrically insulated from one another on said support, the widths of each of the branches of said electrode plates being uniform along the lengths thereof, said electrode plates being adapted to be positioned by said support adjacent the surface of a material to be tested, and the branches of said pair of electrode plates having opposed edges defining